

Attorney Docket No. P13738-US2
Customer Number 27045

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

Listing of Claims

1-49. (Canceled)

50. (New) A method of providing dynamic quality of service (QoS) in an Internet Protocol (IP) network that uses Resource Reservation Protocol (RSVP) aggregation and includes a region using an Integrated Services (Intserv) architecture connected to a region using a Differentiated Services (Diffserv) architecture, said Intserv region including an edge router and said Diffserv region including a border router and a core router, said method comprising the steps of:

interfacing a bandwidth broker with the edge router in the Intserv region and the border router in the Diffserv region, said bandwidth broker communicating directly with the border router without communicating with the core router in the Diffserv region;

providing Intserv-to-Diffserv interoperability by the edge router in the Intserv region and the bandwidth broker, by preventing the border router and the core router in the Diffserv region from processing RSVP messages;

storing and managing RSVP aggregation states in the bandwidth broker using the RSVP aggregation protocol; and

managing dynamic provisioning of QoS in the Diffserv region using the bandwidth broker.

51. (New) The method of claim 50, wherein the bandwidth broker has an aggregator and deaggregator functionality, and the step of managing dynamic provisioning of QoS includes obtaining by the bandwidth broker, resource availability information, wherein the bandwidth broker communicates only with the border router in the Diffserv region to the exclusion of the core router.

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52. (New) The method of claim 51, further comprising using a plurality of bandwidth brokers that interact by using RSVP aggregation.

53. (New) The method of claim 51, further comprising the steps of:
determining by the bandwidth broker, whether reserved resources in the Diffserv region are to be released in a next refreshment period;

upon determining that the reserved resources are not to be released in the next refreshment period, refreshing the reservation of the resources by the bandwidth broker;
and

upon determining that the reserved resources are to be released in the next refreshment period, allowing the reservation of the resources to lapse by the bandwidth broker.

54. (New) The method of claim 53, wherein the step of refreshing the reservation of the resources in the Diffserv region is performed by the bandwidth broker in combination with the border router in the Diffserv region.

55. (New) The method of claim 50, wherein the step of storing and managing RSVP aggregation states in the bandwidth broker includes selectively resizing an RSVP aggregated state pursuant to a new end-to-end RSVP request.

56. (New) The method of claim 50, further comprising managing by the border router in the Diffserv region, resource availability and admission control to the core router using the Load Control protocol.

57. (New) The method of claim 56, wherein the border router contains a reservation state that stores a total amount of resources which were reserved by the Load Control protocol.

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58. (New) The method of claim 57, wherein the bandwidth broker is a bandwidth broker aggregator, and the method includes updating the reservation state if the bandwidth broker aggregator requests modification of the reservation state, or if resource conditions in the Diffserv region, including the core router, suddenly change.

59. (New) The method of claim 50, wherein the step of interfacing the bandwidth broker with the edge router in the Intserv region and the border router in the Diffserv region includes communicating with the bandwidth broker using a protocol selected from the Common Open Policy Services (COPS) protocol and the Simple Network Management Protocol (SNMP).

60. (New) The method of claim 50, wherein the Diffserv region includes a plurality of border routers and core routers, and the step of providing Intserv-to-Diffserv interoperability by the edge router in the Intserv region and the bandwidth broker includes preventing the border routers and the core routers in the Diffserv region from processing RSVP messages by using IP tunneling to prevent border routers and core routers that are RSVP-aware from processing RSVP messages.

61. (New) The method of claim 60, wherein the bandwidth broker includes a bandwidth broker aggregator and a bandwidth broker deaggregator, and the step of providing Intserv-to-Diffserv interoperability includes tunneling RSVP messages between the bandwidth broker aggregator and the bandwidth broker deaggregator to prevent border routers and core routers in the Diffserv region that are RSVP-aware from processing RSVP messages.

62. (New) The method of claim 61, wherein the edge router in the Intserv region sends the RSVP messages directly to either the bandwidth broker aggregator or the bandwidth broker deaggregator, and the RSVP messages are then tunneled between the bandwidth broker aggregator and the bandwidth broker deaggregator.

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63. (New) The method of claim 60, wherein the edge router in the Intserv region sends the RSVP messages to a first border router in the Diffserv region that is capable of communicating with the edge router and the bandwidth broker, and the border router forwards the RSVP messages to either the bandwidth broker aggregator or the bandwidth broker deaggregator, and the RSVP messages are then tunneled between the bandwidth broker aggregator and the bandwidth broker deaggregator.

64. (New) A bandwidth broker for providing dynamic quality of service (QoS) in an Internet Protocol (IP) network that uses Resource Reservation Protocol (RSVP) aggregation and includes a region using an Integrated Services (Intserv) architecture connected to a region using a Differentiated Services (Diffserv) architecture, said Intserv region including an edge router and said Diffserv region including a border router and a core router, said bandwidth broker comprising:

- means for interfacing with the edge router in the Intserv region and with the border router in the Diffserv region, said bandwidth broker communicating directly with the border router without communicating with the core router in the Diffserv region;

- means for tunneling RSVP messages to a second bandwidth broker, thereby preventing the border router and the core router in the Diffserv region from processing the RSVP messages;

- means for storing and managing RSVP aggregation states using the RSVP aggregation protocol; and

- means for managing dynamic provisioning of QoS in the Diffserv region.

65. (New) The bandwidth broker of claim 64, further comprising:

- means for determining whether reserved resources in the Diffserv region are to be released in a next refreshment period;

- means responsive to a determination that the reserved resources are not to be released in the next refreshment period, for refreshing the reservation of the resources by the bandwidth broker; and

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means responsive to a determination that the reserved resources are to be released in the next refreshment period, for allowing the reservation of the resources to lapse by the bandwidth broker.

66. (New) The bandwidth broker of claim 65, wherein the means for refreshing the reservation of the resources in the Diffserv region works in combination with the border router in the Diffserv region to refresh the reservation.

67. (New) The bandwidth broker of claim 65, wherein the bandwidth broker is a bandwidth broker aggregator that updates the resource reservation if resource conditions in the Diffserv region, including the core router, suddenly change.

68. (New) The bandwidth broker of claim 64, wherein the means for storing and managing RSVP aggregation states includes means for selectively resizing an RSVP aggregated state pursuant to a new end-to-end RSVP request.

69. (New) The bandwidth broker of claim 64, wherein the bandwidth broker communicates with the edge router in the Intserv region and with the border router in the Diffserv region using a protocol selected from the Common Open Policy Services (COPS) protocol and the Simple Network Management Protocol (SNMP).

70. (New) The bandwidth broker of claim 64, wherein the bandwidth broker is a bandwidth broker aggregator and the second bandwidth broker is a bandwidth broker deaggregator.

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71. (New) A network subsystem for providing dynamic quality of service (QoS) in an Internet Protocol (IP) network that uses Resource Reservation Protocol (RSVP) aggregation and includes a region using an Integrated Services (Intserv) architecture connected to a region using a Differentiated Services (Diffserv) architecture, said network subsystem comprising:

an edge router in the Intserv region;

a border router and a core router in the Diffserv region; and

a bandwidth broker that interfaces the edge router in the Intserv region with the border router in the Diffserv region, said bandwidth broker comprising:

means for communicating directly with the border router in the Diffserv region without communicating with the core router in the Diffserv region;

means for tunneling RSVP messages to a second bandwidth broker, thereby preventing the border router and the core router in the Diffserv region from processing the RSVP messages;

means for storing and managing RSVP aggregation states using the RSVP aggregation protocol; and

means for managing dynamic provisioning of QoS in the Diffserv region.

72. (New) The network subsystem of claim 71, wherein the bandwidth broker is a bandwidth broker aggregator and the second bandwidth broker is a bandwidth broker deaggregator.

73. (New) The network subsystem of claim 72, wherein the edge router in the Intserv region sends the RSVP messages directly to either the bandwidth broker aggregator or the bandwidth broker deaggregator, and the RSVP messages are then tunneled between the bandwidth broker aggregator and the bandwidth broker deaggregator.

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74. (New) The network subsystem of claim 72, wherein the Diffserv region includes a plurality of border routers and core routers, and the edge router in the Intserv region sends the RSVP messages to a first border router in the Diffserv region that is capable of communicating with the edge router and the bandwidth broker, and the border router forwards the RSVP messages to either the bandwidth broker aggregator or the bandwidth broker deaggregator, and the RSVP messages are then tunneled between the bandwidth broker aggregator and the bandwidth broker deaggregator.

75. (New) The network subsystem of claim 71, wherein the border router in the Diffserv region includes means for managing resource availability and admission control to the core router using the Load Control protocol.

76. (New) The network subsystem of claim 75, wherein the border router contains a reservation state that stores a total amount of resources which were reserved by the Load Control protocol.